

7.0 RESULTS AND PROJECT MAPS

The results from the runoff and load calculations for the project area are presented for the three rainfall cases graphically and in detail in Figures 7.1 through 7.39, and listed numerically for each watershed in Tables 7.1 through 7.3. For proper interpretation of the results shown on the Figures, it is necessary to observe the following:

Subwatershed Based Figures: Example Figures 7.1 - 7.9

There are a set of eight subwatershed based figures for each rainfall case analyzed:

- Each Figure presents a single parameter.
- The loads are presented in kilograms per hectare and runoff volume is in inches.
- One hectare equals 2.47 acres.
- The ranges of values used in the color coding of subwatersheds are listed in a legend on the lower left corner of the Figure.
- To assist in locating specific areas within the basin, a mylar overlay has been provided in Volume II which contains the Figures.

The data analysis for the subwatershed Figures 7.1 through 7.9, for example, indicates that the highest runoff volume contribution in inches (runoff per unit area) is actually from the urban center of Harris County. Similarly, the highest TSS load contribution on a per hectare basis is from the urbanized areas in the watershed. The actual values for all the parameters for each of the three cases are listed in Appendix III.

Watershed Based Figures: Example Figures 7.10 - 7.12

There is a set of three watershed-based Figures for each rainfall case analyzed. These Figures follow the subwatershed based maps and summarize the total runoff and loads by watershed for the study area.

- Figures are typically divided into four quarters. The runoff calculation results are always presented in the northwest quarter, while the load results are portrayed in the other three with the parameter name listed in the top left hand corner of each quarter.
- Runoff volumes and loads are presented for each individual watershed and are not accumulated as one proceeds towards the bay.

- Figures do not include the data for Lake Livingston and Lake Houston. For information on the reservoir loads, refer to Section 5.5.
- The color schemes used in these Figures are the same as for the subwatershed based Figures, however, the ranges of values and units are different (see the legend in the left hand corner of each quarter).
- Results shown on the Figures are based on total watershed area.
- The Figure Title indicates the rainfall case that is being shown.
- To assist in locating specific areas within the basin, a mylar overlay has been provided in Volume II which contains the Figures.

The analysis of data from Figures 7.10 - 7.12, for example, would indicate that, for Case 1, the Trinity River, Trinity Bay, and West Bay watersheds contribute the largest amounts of runoff into the bay, as would be expected due to their large drainage areas. The Trinity River watershed, being the largest watershed, has the highest load values for TSS, TN, and TP. The urban watersheds such as the Ship Channel and Brays Bayou, contribute relatively high volumes of NPS oil and grease to the bay because of the high oil and grease EMCs for urban land uses. Tables 7.1a, b and c provide the actual parameter values for each watershed in three units: kilogram, mg/l and kilogram per hectare.

The remainder of the Results section will summarize the general trends observed in Figures 7.1 through 7.39 for each of the three storms.

1. Tables 7.1a, b and c present non-point source loads by watershed in three units: kilogram, mg/l and kilograms per hectare for Case 1. These data indicate that non-point source impacts on the Bay from the adjacent drainage areas are rather significant. During an average year, it is estimated that 481 million kilogram of TSS and 26.3 million kilogram BOD, for example, would be delivered to the bay.

For an average year, the highest TSS, TN, TP, BOD, dissolved copper, and pesticide total loads are received from the Trinity River watershed due to its size. The Ship Channel watershed is the major contributor of oil and grease and fecal coliform.

The highest NPS concentrations, except for TSS, evolve from the urbanized watersheds, Buffalo Bayou and Brays Bayou. The Addicks and Barker watersheds have high TSS concentrations due to their relatively large percentage of barren land (3 and 8%, respectively).

The data in Table 7.1c indicate that, on a per area basis, the White Oak Bayou watershed has the highest TN, TP, BOD, dissolved copper and pesticides contributions. Brays Bayou has the highest oil and grease and fecal coliform loads per area and the Barker Reservoir watershed has the highest TSS load per area.

2. Case 2 (the wet year analysis) results presented in Tables 7.2a, b, and c show similar trends to Case 1. Overall, Case 2 loads were 40-60% higher than Case 1.
3. The individual storm loads, as can be seen from Case 3 results (Tables 7.3a, b and c), amount to 15-20% of the annual NPS loads.
4. Tables 7.4a and 7.4b list NPS loads and percentages by land use category for Case 1. The data in Tables 7.4a and 7.4b indicate that the high density urban land use category is the main contributor of NPS loads to the bay for all of the parameters. Most notable is their high percentage contribution of Oil & Grease (87%), Fecal Coliform (59%), and Pesticides (50%).
5. Table 7.5 is a summary of the basin NPS loads for the three cases as well as the total loads (combined point source, low-flow, and NPS loads) from Lakes Houston and Livingston. In the annual Cases 1 and 2, the lakes provide a substantial fraction of the total Galveston Bay load for TN, TP, BOD, dissolved copper and pesticides.
6. The calculated total suspended solids for large urban watersheds such as Brays Bayou (see Figure 7.37), were lower than the measured TSS values for those watersheds (see Table 5.10, Land Use Category B3). Although the difference is not large, the apparent discrepancy has been noted in other Houston-area NPS studies (Winslow, 1986). Possible explanations are:
 - The water quality data was collected in the early 1980s during a period of intense urban development when considerable land was exposed for construction. The LANDSAT imagery, taken in 1990, does not reflect the construction areas that existed in the 1980s and therefore may not correlate exactly to the EMC database.
 - Much of the intense erosion may be occurring in areas smaller than the minimum resolution of the LANDSAT imagery (30 meters by 30 meters). Therefore the actual "barren land" and its associated high TSS loads are underrepresented.
 - The intense urbanization of the Houston area in the 1980s has greatly increased the runoff volume and peak flows that occur

during storm events. Heavy streambank erosion in grass-lined swales and channels could be responsible for the very high TSS loads; this was observed for one of the Nationwide Urban Runoff program sampling locations.

7. Annual NPS loads for other heavy metals besides dissolved copper are presented in Table 7.6. Only results from Case 1, an average year, are shown.

Table 7.1a - Case 1: Average Year Total Non-Point Source (NPS) Loads by Watershed

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| NPS Loads | | | | | | | | | | |
|----------------------|--------------|----------------------------------|-------------------------------------|------------------------------|--------------------------------|--|-----------------------------|---------------------------|-----------------------|-----------------|
| Watershed | Area (sq mi) | Runoff Volume (thousand acre-ft) | Total Suspended Solids (million kg) | Total Nitrogen (thousand kg) | Total Phosphorus (thousand kg) | Biochemical Oxygen Demand (million kg) | Oil and Grease (million kg) | Fecal Coliform (xE15 col) | Dissolved copper (kg) | Pesticides (kg) |
| Project Area | 4,238 | 3,010 | 481 | 6,420 | 1,110 | 26.3 | 14.2 | 355 | 10,900 | 749 |
| Addicks Reservoir | 134 | 82 | 22 | 195 | 36 | 0.7 | 0.4 | 9 | 312 | 20 |
| Armand/Taylor Bayou | 77 | 70 | 12 | 167 | 29 | 0.7 | 0.5 | 11 | 255 | 22 |
| Austin/Bastrop Bayou | 213 | 121 | 21 | 245 | 44 | 0.9 | 0.2 | 9 | 442 | 21 |
| Barker Reservoir | 122 | 71 | 32 | 181 | 31 | 0.6 | 0.2 | 6 | 271 | 14 |
| Brays Bayou | 127 | 147 | 29 | 406 | 75 | 1.7 | 1.7 | 34 | 561 | 63 |
| Buffalo Bayou | 105 | 116 | 22 | 337 | 65 | 1.4 | 1.3 | 27 | 445 | 51 |
| Cedar Bayou | 211 | 153 | 26 | 321 | 58 | 1.2 | 0.3 | 13 | 576 | 30 |
| Chocolate Bayou | 170 | 95 | 19 | 188 | 36 | 0.6 | 0.1 | 5 | 354 | 15 |
| Clear Creek | 182 | 138 | 22 | 301 | 51 | 1.2 | 0.7 | 16 | 503 | 34 |
| Dickinson Bayou | 101 | 60 | 8 | 130 | 21 | 0.5 | 0.2 | 6 | 223 | 13 |
| East Bay | 288 | 193 | 26 | 388 | 68 | 1.6 | 0.5 | 17 | 679 | 36 |
| Greens Bayou | 209 | 184 | 30 | 497 | 92 | 2.1 | 1.4 | 34 | 702 | 66 |
| North Bay | 25 | 25 | 4 | 65 | 11 | 0.3 | 0.2 | 5 | 94 | 9 |
| San Jacinto River | 68 | 65 | 8 | 126 | 22 | 0.5 | 0.2 | 7 | 202 | 14 |
| Ship Channel | 166 | 198 | 34 | 498 | 90 | 2.0 | <u>1.9</u> | <u>39</u> | 713 | 74 |
| Sims Bayou | 93 | 91 | 16 | 235 | 41 | 1.0 | 0.8 | 17 | 346 | 33 |
| South Bay | 78 | 68 | 10 | 138 | 24 | 0.6 | 0.6 | 12 | 211 | 22 |
| Trinity Bay | 317 | 225 | 26 | 356 | 59 | 1.5 | 0.3 | 12 | 708 | 32 |
| Trinity River | 1,099 | 572 | 62 | 877 | 124 | 4.3 | 0.5 | 27 | 2,110 | 82 |
| West Bay | 344 | 212 | 30 | 405 | 68 | 1.6 | 0.9 | 21 | 706 | 44 |
| White Oak Bayou | 110 | 128 | 24 | 365 | 69 | 1.5 | 1.3 | 29 | 488 | 54 |
| Median | 134 | 121 | 22 | 301 | 51 | 1.2 | 0.5 | 13 | 445 | 32 |
| Maximum | 1,099 | 572 | 62 | 877 | 124 | 4.3 | 1.9 | 39 | 2,110 | 82 |
| Minimum | 25 | 25 | 4 | 65 | 11 | 0.3 | 0.1 | 5 | 94 | 9 |

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Note:

1. Boldface/underline indicates highest watershed load for the parameter.

Table 7.1b - Case 1: Average Year Total Non-Point Source (NPS) Concentrations by Watershed

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| Watershed | Area (sq mi) | Runoff Volume (thousand acre-ft) | Total Suspended Solids (mg/l) | Total Nitrogen (mg/l) | Total Phosphorus (mg/l) | NPS Concentrations | | | | |
|----------------------|-----------------|--|--|-----------------------------|-------------------------------|---|-----------------------------|-----------------------------------|-------------------------------------|----------------------------|
| | | | | | | Biochemical Oxygen Demand (mg/l) | Oil and Grease (mg/l) | Fecal Coliform (col/100 ml) | Dissolved copper (μ g/l) | Pesticides (μ g/l) |
| Project Area | 4,238 | 3,010 | 130 | 1.73 | 0.30 | 7.1 | 3.8 | 9,576 | 2.9 | 0.20 |
| Addicks Reservoir | 134 | 82 | 213 | 1.94 | 0.35 | 6.8 | 3.7 | 9,122 | 3.1 | 0.20 |
| Armand/Taylor Bayou | 77 | 70 | 135 | 1.94 | 0.33 | 7.9 | 5.9 | 12,991 | 3.0 | 0.26 |
| Austin/Bastrop Bayou | 213 | 121 | 141 | 1.64 | 0.30 | 6.0 | 1.6 | 5,858 | 3.0 | 0.14 |
| Barker Reservoir | 122 | 71 | <u>368</u> | 2.06 | 0.35 | 6.6 | 2.4 | 6,557 | 3.1 | 0.16 |
| Brays Bayou | 127 | 147 | 158 | 2.24 | 0.41 | 9.1 | <u>9.2</u> | 18,558 | 3.1 | 0.35 |
| Buffalo Bayou | 105 | 116 | 151 | <u>2.36</u> | <u>0.46</u> | <u>9.7</u> | 8.9 | <u>19,178</u> | <u>3.1</u> | <u>0.36</u> |
| Cedar Bayou | 211 | 153 | 136 | 1.70 | 0.31 | 6.5 | 1.8 | 6,686 | 3.1 | 0.16 |
| Chocolate Bayou | 170 | 95 | 164 | 1.61 | 0.31 | 5.4 | 1.1 | 4,703 | 3.0 | 0.13 |
| Clear Creek | 182 | 138 | 131 | 1.77 | 0.30 | 6.9 | 4.0 | 9,590 | 3.0 | 0.20 |
| Dickinson Bayou | 101 | 60 | 112 | 1.76 | 0.28 | 7.0 | 2.5 | 7,876 | 3.0 | 0.17 |
| East Bay | 288 | 193 | 109 | 1.63 | 0.29 | 6.6 | 1.9 | 6,983 | 2.9 | 0.15 |
| Greens Bayou | 209 | 184 | 133 | 2.19 | 0.40 | 9.3 | 6.0 | 15,003 | 3.1 | 0.29 |
| North Bay | 25 | 25 | 129 | 2.09 | 0.37 | 8.6 | 7.1 | 15,365 | 3.0 | 0.29 |
| San Jacinto River | 68 | 65 | 101 | 1.58 | 0.27 | 6.8 | 2.9 | 8,671 | 2.5 | 0.18 |
| Ship Channel | 166 | 198 | 139 | 2.04 | 0.37 | 8.4 | 7.9 | 16,157 | 2.9 | 0.30 |
| Sims Bayou | 93 | 91 | 142 | 2.10 | 0.37 | 8.5 | 6.9 | 15,039 | 3.1 | 0.29 |
| South Bay | 78 | 68 | 120 | 1.64 | 0.28 | 6.7 | 7.3 | 13,691 | 2.5 | 0.26 |
| Trinity Bay | 317 | 225 | 92 | 1.28 | 0.21 | 5.3 | 1.0 | 4,475 | 2.6 | 0.11 |
| Trinity River | 1,099 | 572 | 88 | 1.24 | 0.18 | 6.1 | 0.7 | 3,833 | 3.0 | 0.12 |
| West Bay | 344 | 212 | 114 | 1.55 | 0.26 | 6.1 | 3.3 | 8,081 | 2.7 | 0.17 |
| White Oak Bayou | 110 | 128 | 152 | 2.32 | 0.44 | 9.5 | 8.5 | 18,332 | 3.1 | 0.34 |
| Median | 134 | 121 | 135 | 1.77 | 0.31 | 6.8 | 3.7 | 9,122 | 3.0 | 0.20 |
| Maximum | 1,099 | 572 | <u>368</u> | <u>2.36</u> | <u>0.46</u> | <u>9.7</u> | <u>9.2</u> | <u>19,178</u> | <u>3.1</u> | <u>0.36</u> |
| Minimum | 25 | 25 | 88 | 1.24 | 0.18 | 5.3 | 0.7 | 3,833 | 2.5 | 0.11 |

Note:

1. Boldface/underline indicates highest watershed load for the parameter.

Table 7.1c - Case 1: Average Year Total Non-Point Source (NPS) Loads per Area by Watershed
 Non-Point Source Characterization Project
 Galveston Bay National Estuary Program

| NPS Loads by Unit Area | | | | | | | | | | |
|------------------------|-----------------|--|---|------------------------------|--------------------------------|--|------------------------------|------------------------------------|---------------------------------------|------------------------------|
| Watershed | Area (sq mi) | Runoff Volume (thousand acre-ft) | Total Suspended Solids (kg/ha) | Total Nitrogen (kg/ha) | Total Phosphorus (kg/ha) | Biochemical Oxygen Demand (kg/ha) | Oil and Grease (kg/ha) | Fecal Coliform (bil. col/ha) | Dissolved copper (1/1000 kg/ha) | Pesticides (1/1000 kg/ha) |
| Project Area | 4,238 | 3,010 | 438 | 5.85 | 1.0 | 24.0 | 12.9 | 323 | 9.9 | 0.7 |
| Addicks Reservoir | 134 | 82 | 618 | 5.60 | 1.0 | 19.7 | 10.7 | 264 | 9.0 | 0.6 |
| Armand/Taylor Bayou | 77 | 70 | 584 | 8.41 | 1.4 | 34.1 | 25.5 | 564 | 12.8 | 1.1 |
| Austin/Bastrop Bayou | 213 | 121 | 380 | 4.44 | 0.8 | 16.1 | 4.2 | 158 | 8.0 | 0.4 |
| Barker Reservoir | 122 | 71 | 1,022 | 5.73 | 1.0 | 18.2 | 6.7 | 182 | 8.6 | 0.4 |
| Brays Bayou | 127 | 147 | 867 | 12.30 | 2.3 | 50.0 | 50.6 | 1,018 | 17.0 | 1.9 |
| Buffalo Bayou | 105 | 116 | 795 | 12.40 | 2.4 | 51.2 | 46.7 | 1,008 | 16.4 | 1.9 |
| Cedar Bayou | 211 | 153 | 469 | 5.86 | 1.1 | 22.5 | 6.3 | 230 | 10.5 | 0.5 |
| Chocolate Bayou | 170 | 95 | 434 | 4.27 | 0.8 | 14.3 | 2.9 | 125 | 8.0 | 0.3 |
| Clear Creek | 182 | 138 | 474 | 6.39 | 1.1 | 25.1 | 14.4 | 346 | 10.7 | 0.7 |
| Dickinson Bayou | 101 | 60 | 317 | 4.97 | 0.8 | 19.7 | 7.2 | 222 | 8.5 | 0.5 |
| East Bay | 288 | 193 | 348 | 5.21 | 0.9 | 21.0 | 6.1 | 223 | 9.1 | 0.5 |
| Greens Bayou | 209 | 184 | 559 | 9.20 | 1.7 | 38.9 | 25.4 | 630 | 13.0 | 1.2 |
| North Bay | 25 | 25 | 621 | 10.06 | 1.8 | 41.6 | 33.9 | 740 | 14.6 | 1.4 |
| San Jacinto River | 68 | 65 | 454 | 7.12 | 1.2 | 30.7 | 13.2 | 391 | 11.4 | 0.8 |
| Ship Channel | 166 | 198 | 787 | 11.56 | 2.1 | 47.3 | 44.6 | 914 | 16.5 | 1.7 |
| Sims Bayou | 93 | 91 | 660 | 9.76 | 1.7 | 39.6 | 32.2 | 697 | 14.4 | 1.3 |
| South Bay | 78 | 68 | 503 | 6.87 | 1.2 | 27.8 | 30.5 | 572 | 10.5 | 1.1 |
| Trinity Bay | 317 | 225 | 312 | 4.34 | 0.7 | 18.0 | 3.4 | 151 | 8.6 | 0.4 |
| Trinity River | 1,099 | 572 | 217 | 3.08 | 0.4 | 15.0 | 1.9 | 95 | 7.4 | 0.3 |
| West Bay | 344 | 212 | 335 | 4.55 | 0.8 | 18.0 | 9.6 | 237 | 7.9 | 0.5 |
| White Oak Bayou | 110 | 128 | 840 | 12.78 | 2.4 | 52.5 | 46.9 | 1,012 | 17.1 | 1.9 |
| Median | 134 | 121 | 503 | 6.39 | 1.1 | 25.1 | 13.2 | 346 | 10.5 | 0.7 |
| Maximum | 1,099 | 572 | 1,022 | 12.78 | 2.4 | 52.5 | 50.6 | 1,018 | 17.1 | 1.9 |
| Minimum | 25 | 25 | 217 | 3.08 | 0.4 | 14.3 | 1.9 | 95 | 7.4 | 0.3 |

Note:

1. Boldface/underline indicates highest watershed load for the parameter.

Table 7.2a - Case 2: Wet Year Total Non-Point Source (NPS) Loads by Watershed

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| NPS Loads | | | | | | | | | | |
|----------------------|--------------|----------------------------------|-------------------------------------|------------------------------|--------------------------------|--|-----------------------------|---------------------------|-----------------------|-----------------|
| Watershed | Area (sq mi) | Runoff Volume (thousand acre-ft) | Total Suspended Solids (million kg) | Total Nitrogen (thousand kg) | Total Phosphorus (thousand kg) | Biochemical Oxygen Demand (million kg) | Oil and Grease (million kg) | Fecal Coliform (xE15 col) | Dissolved copper (kg) | Pesticides (kg) |
| Project Area | 4,238 | 4,790 | 747 | 10,100 | 1,730 | 41.5 | 20.4 | 531 | 17,500 | 1,140 |
| Addicks Reservoir | 134 | 120 | 31 | 282 | 52 | 1.0 | 0.5 | 13 | 457 | 28 |
| Armand/Taylor Bayou | 77 | 124 | 20 | 293 | 50 | 1.2 | 0.8 | 19 | 457 | 37 |
| Austin/Bastrop Bayou | 213 | 191 | 33 | 385 | 69 | 1.4 | 0.3 | 13 | 704 | 32 |
| Barker Reservoir | 122 | 105 | 47 | 264 | 45 | 0.8 | 0.3 | 8 | 401 | 20 |
| Brays Bayou | 127 | 226 | 43 | 630 | 117 | 2.6 | 2.5 | 51 | 866 | 95 |
| Buffalo Bayou | 105 | 167 | 31 | 486 | 94 | 2.0 | 1.8 | 39 | 640 | 72 |
| Cedar Bayou | 211 | 241 | 40 | 500 | 90 | 1.9 | 0.5 | 19 | 908 | 46 |
| Chocolate Bayou | 170 | 151 | 30 | 297 | 56 | 1.0 | 0.2 | 8 | 566 | 23 |
| Clear Creek | 182 | 242 | 39 | 520 | 87 | 2.0 | 1.0 | 26 | 889 | 56 |
| Dickinson Bayou | 101 | 94 | 13 | 201 | 32 | 0.8 | 0.3 | 9 | 351 | 19 |
| East Bay | 288 | 308 | 41 | 615 | 107 | 2.5 | 0.6 | 25 | 1,100 | 55 |
| Greens Bayou | 209 | 268 | 43 | 720 | 132 | 3.1 | 1.9 | 48 | 1,030 | 94 |
| North Bay | 25 | 44 | 7 | 111 | 19 | 0.5 | 0.3 | 8 | 163 | 15 |
| San Jacinto River | 68 | 96 | 12 | 189 | 33 | 0.8 | 0.3 | 10 | 307 | 21 |
| Ship Channel | 166 | 310 | 53 | 779 | 140 | 3.2 | <u>2.9</u> | <u>60</u> | 1,120 | 114 |
| Sims Bayou | 93 | 159 | 27 | 408 | 71 | 1.7 | 1.2 | 28 | 609 | 54 |
| South Bay | 78 | 97 | 14 | 198 | 34 | 0.8 | 0.8 | 16 | 307 | 30 |
| Trinity Bay | 317 | 355 | 41 | 572 | 93 | 2.4 | 0.4 | 19 | 1,160 | 50 |
| Trinity River | 1,099 | 986 | 103 | 1,480 | 205 | 7.4 | 0.8 | 43 | 3,660 | 137 |
| West Bay | 344 | 323 | 46 | 621 | 103 | 2.5 | 1.2 | 31 | 1,100 | 65 |
| White Oak Bayou | 110 | 181 | 34 | 518 | 98 | 2.1 | 1.8 | 40 | 692 | 75 |
| Median | 134 | 181 | 34 | 486 | 87 | 1.9 | 0.8 | 19 | 692 | 50 |
| Maximum | 1,099 | 986 | 103 | 1,480 | 205 | 7.4 | 2.9 | 60 | 3,660 | 137 |
| Minimum | 25 | 44 | 7 | 111 | 19 | 0.5 | 0.2 | 8 | 163 | 15 |

Notes:

1. Boldface/underline indicates highest watershed load for the parameter.

Table 7.2b - Case 2: Wet Year Total Non-Point Source (NPS) Concentrations by Watershed

Non-Point Source Characterization Project

Galveston Bay National Estuary Program

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| Watershed | NPS Concentrations | | | | | | | | | |
|----------------------|--------------------|--|--|-----------------------------|-------------------------------|---|-----------------------------|-----------------------------------|-------------------------------------|----------------------------|
| | Area (sq mi) | Runoff Volume (thousand acre-ft) | Total Suspended Solids (mg/l) | Total Nitrogen (mg/l) | Total Phosphorus (mg/l) | Biochemical Oxygen Demand (mg/l) | Oil and Grease (mg/l) | Fecal Coliform (col/100 ml) | Dissolved copper (μ g/l) | Pesticides (μ g/l) |
| Project Area | 4,238 | 4,790 | 127 | 1.71 | 0.29 | 7.0 | 3.5 | 9,001 | 3.0 | 0.2 |
| Addicks Reservoir | 134 | 120 | 211 | 1.91 | 0.35 | 6.7 | 3.3 | 8,593 | 3.1 | 0.2 |
| Armand/Taylor Bayou | 77 | 124 | 132 | 1.92 | 0.33 | 7.8 | 5.3 | 12,113 | 3.0 | 0.2 |
| Austin/Bastrop Bayou | 213 | 191 | 140 | 1.64 | 0.29 | 6.0 | 1.4 | 5,569 | 3.0 | 0.1 |
| Barker Reservoir | 122 | 105 | 360 | 2.04 | 0.35 | 6.5 | 2.2 | 6,171 | 3.1 | 0.2 |
| Brays Bayou | 127 | 226 | 156 | 2.26 | 0.42 | 9.2 | 8.8 | 18,215 | 3.1 | 0.3 |
| Buffalo Bayou | 105 | 167 | 149 | 2.36 | 0.46 | 9.7 | 8.6 | 18,913 | 3.1 | 0.4 |
| Cedar Bayou | 211 | 241 | 134 | 1.68 | 0.30 | 6.4 | 1.7 | 6,334 | 3.1 | 0.2 |
| Chocolate Bayou | 170 | 151 | 162 | 1.60 | 0.30 | 5.4 | 1.0 | 4,458 | 3.0 | 0.1 |
| Clear Creek | 182 | 242 | 130 | 1.74 | 0.29 | 6.8 | 3.4 | 8,723 | 3.0 | 0.2 |
| Dickinson Bayou | 101 | 94 | 111 | 1.74 | 0.28 | 6.9 | 2.3 | 7,402 | 3.0 | 0.2 |
| East Bay | 288 | 308 | 108 | 1.62 | 0.28 | 6.6 | 1.7 | 6,617 | 2.9 | 0.1 |
| Greens Bayou | 209 | 268 | 131 | 2.18 | 0.40 | 9.2 | 5.7 | 14,512 | 3.1 | 0.3 |
| North Bay | 25 | 44 | 125 | 2.07 | 0.36 | 8.6 | 6.5 | 14,600 | 3.0 | 0.3 |
| San Jacinto River | 68 | 96 | 101 | 1.60 | 0.28 | 6.9 | 2.8 | 8,458 | 2.6 | 0.2 |
| Ship Channel | 166 | 310 | 138 | 2.04 | 0.37 | 8.4 | 7.5 | 15,715 | 2.9 | 0.3 |
| Sims Bayou | 93 | 159 | 139 | 2.08 | 0.36 | 8.5 | 6.3 | 14,145 | 3.1 | 0.3 |
| South Bay | 78 | 97 | 121 | 1.66 | 0.28 | 6.8 | 7.0 | 13,406 | 2.6 | 0.3 |
| Trinity Bay | 317 | 355 | 94 | 1.31 | 0.21 | 5.5 | 0.9 | 4,368 | 2.7 | 0.1 |
| Trinity River | 1,099 | 986 | 85 | 1.22 | 0.17 | 6.1 | 0.6 | 3,574 | 3.0 | 0.1 |
| West Bay | 344 | 323 | 114 | 1.56 | 0.26 | 6.2 | 3.0 | 7,667 | 2.8 | 0.2 |
| White Oak Bayou | 110 | 181 | 151 | 2.32 | 0.44 | 9.6 | 8.2 | 17,988 | 3.1 | 0.3 |
| Median | 134 | 181 | 132 | 1.74 | 0.30 | 6.8 | 3.3 | 8,593 | 3.0 | 0.2 |
| Maximum | 1,099 | 986 | 360 | 2.36 | 0.46 | 9.7 | 8.8 | 18,913 | 3.1 | 0.4 |
| Minimum | 25 | 44 | 85 | 1.22 | 0.17 | 5.4 | 0.6 | 3,574 | 2.6 | 0.1 |

Notes:

1. Boldface/underline indicates highest watershed load for the parameter.

Table 7.2c - Case 2: Wet Year Total Non-Point Source (NPS) Loads per Area by Watershed

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| NPS Loads by Unit Area | | | | | | | | | | |
|------------------------|--------------|------------------------------|--------------------------------|------------------------|--------------------------|-----------------------------------|------------------------|------------------------------|---------------------------------|---------------------------|
| Watershed | Area (sq mi) | Runoff Volume (1000 acre-ft) | Total Suspended Solids (kg/ha) | Total Nitrogen (kg/ha) | Total Phosphorus (kg/ha) | Biochemical Oxygen Demand (kg/ha) | Oil and Grease (kg/ha) | Fecal Coliform (bil. col/ha) | Dissolved copper (1/1000 kg/ha) | Pesticides (1/1000 kg/ha) |
| Project Area | 4,238 | 4,790 | 681 | 9.20 | 1.58 | 37.8 | 18.6 | 484 | 15.9 | 1.0 |
| Addicks Reservoir | 134 | 120 | 896 | 8.10 | 1.48 | 28.4 | 14.1 | 365 | 13.1 | 0.8 |
| Armand/Taylor Bayou | 77 | 124 | 1,012 | 14.75 | 2.50 | 59.9 | 40.6 | 931 | 23.0 | 1.9 |
| Austin/Bastrop Bayou | 213 | 191 | 596 | 6.97 | 1.24 | 25.4 | 5.9 | 237 | 12.7 | 0.6 |
| Barker Reservoir | 122 | 105 | 1,475 | 8.35 | 1.43 | 26.5 | 8.9 | 253 | 12.7 | 0.6 |
| Brays Bayou | 127 | 226 | 1,315 | 19.09 | 3.55 | 77.6 | 74.3 | 1,537 | 26.2 | 2.9 |
| Buffalo Bayou | 105 | 167 | 1,130 | 17.89 | 3.47 | 73.6 | 65.1 | 1,432 | 23.6 | 2.7 |
| Cedar Bayou | 211 | 241 | 729 | 9.13 | 1.64 | 34.9 | 8.9 | 343 | 16.6 | 0.8 |
| Chocolate Bayou | 170 | 151 | 686 | 6.75 | 1.27 | 22.7 | 4.0 | 188 | 12.9 | 0.5 |
| Clear Creek | 182 | 242 | 822 | 11.04 | 1.84 | 43.1 | 21.7 | 552 | 18.9 | 1.2 |
| Dickinson Bayou | 101 | 94 | 489 | 7.68 | 1.22 | 30.6 | 10.1 | 328 | 13.4 | 0.7 |
| East Bay | 288 | 308 | 552 | 8.26 | 1.44 | 33.4 | 8.7 | 337 | 14.8 | 0.7 |
| Greens Bayou | 209 | 268 | 800 | 13.33 | 2.44 | 56.5 | 34.6 | 887 | 19.1 | 1.7 |
| North Bay | 25 | 44 | 1,048 | 17.28 | 3.02 | 72.1 | 54.0 | 1,221 | 25.4 | 2.4 |
| San Jacinto River | 68 | 96 | 678 | 10.68 | 1.84 | 46.2 | 18.4 | 565 | 17.4 | 1.2 |
| Ship Channel | 166 | 310 | 1,220 | 18.08 | 3.25 | 74.3 | 66.6 | 1,392 | 26.0 | 2.6 |
| Sims Bayou | 93 | 159 | 1,129 | 16.94 | 2.95 | 68.9 | 51.5 | 1,150 | 25.3 | 2.2 |
| South Bay | 78 | 97 | 716 | 9.85 | 1.68 | 40.1 | 41.8 | 796 | 15.3 | 1.5 |
| Trinity Bay | 317 | 355 | 500 | 6.97 | 1.14 | 29.3 | 4.9 | 233 | 14.1 | 0.6 |
| Trinity River | 1,099 | 986 | 362 | 5.20 | 0.72 | 25.9 | 2.7 | 153 | 12.9 | 0.5 |
| West Bay | 344 | 323 | 511 | 6.98 | 1.16 | 27.6 | 13.4 | 343 | 12.4 | 0.7 |
| White Oak Bayou | 110 | 181 | 1,180 | 18.13 | 3.43 | 74.6 | 63.7 | 1,404 | 24.2 | 2.6 |
| Median | 134 | 181 | 800 | 9.85 | 1.68 | 40.1 | 18.4 | 552 | 16.6 | 1.2 |
| Maximum | 1,099 | 986 | 1,475 | 19.09 | 3.55 | 77.6 | 74.3 | 1,537 | 26.2 | 2.9 |
| Minimum | 25 | 44 | 362 | 5.20 | 0.72 | 22.7 | 2.7 | 153 | 12.4 | 0.5 |

Notes:

1. Boldface/underline indicates highest watershed load for the parameter.

Table 7.3a - Case 3: Individual Storm Total Non-Point Source (NPS) Loads by Watershed

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| NPS Loads | | | | | | | | | | |
|----------------------|-----------------|--|--|------------------------------------|--------------------------------------|--|------------------------------------|---------------------------------|-----------------------------|--------------------|
| Watershed | Area (sq mi) | Runoff Volume (thousand acre-ft) | Total Suspended Solids (million kg) | Total Nitrogen (thousand kg) | Total Phosphorus (thousand kg) | Biochemical Oxygen Demand (thousand kg) | Oil and Grease (thousand kg) | Fecal Coliform (xE15 col) | Dissolved copper (kg) | Pesticides (kg) |
| Project Area | 4,238 | 603 0 | 91.6 | 1,230 | 205 | 5,100 | 1,840 | 55 | 2,250 | 125 |
| Addicks Reservoir | 134 | 20 | 5.1 | 46 | 8 | 159 | 55 | 2 | 78 | 4 |
| Armand/Taylor Bayou | 77 | 12 | 1.9 | 28 | 5 | 114 | 62 | 2 | 45 | 3 |
| Austin/Bastrop Bayou | 213 | 30 | 5.0 | 59 | 10 | 216 | 34 | 2 | 112 | 4 |
| Barker Reservoir | 122 | 19 | 7.4 | 44 | 8 | 139 | 31 | 1 | 71 | 3 |
| Brays Bayou | 127 | 23 | 4.4 | 63 | 12 | 255 | 212 | 5 | 88 | 9 |
| Buffalo Bayou | 105 | 19 | 3.4 | 55 | 11 | 224 | 166 | 4 | 72 | 8 |
| Cedar Bayou | 211 | 30 | 4.8 | 60 | 11 | 232 | 44 | 2 | 114 | 5 |
| Chocolate Bayou | 170 | 24 | 4.6 | 46 | 9 | 156 | 18 | 1 | 91 | 3 |
| Clear Creek | 182 | 27 | 4.1 | 57 | 9 | 224 | 86 | 3 | 101 | 6 |
| Dickinson Bayou | 101 | 14 | 1.9 | 30 | 4 | 119 | 27 | 1 | 54 | 3 |
| East Bay | 288 | 39 | 5.1 | 76 | 13 | 315 | 59 | 3 | 145 | 6 |
| Greens Bayou | 209 | 33 | 5.0 | 85 | 15 | 366 | 177 | 5 | 127 | 10 |
| North Bay | 25 | 4 | 0.6 | 10 | 2 | 43 | 27 | 1 | 16 | 1 |
| San Jacinto River | 68 | 10 | 1.3 | 21 | 4 | 92 | 29 | 1 | 36 | 2 |
| Ship Channel | 166 | 29 | 4.8 | 73 | 13 | 302 | 229 | 5 | 107 | 10 |
| Sims Bayou | 93 | 15 | 2.5 | 38 | 6 | 154 | 95 | 2 | 58 | 5 |
| South Bay | 78 | 13 | 1.9 | 28 | 5 | 114 | 94 | 2 | 45 | 4 |
| Trinity Bay | 317 | 44 | 5.2 | 73 | 12 | 313 | 37 | 2 | 155 | 6 |
| Trinity River | 1,099 | 127 | 12.5 | 185 | 24 | 949 | 66 | 5 | 479 | 17 |
| West Bay | 344 | 49 | 6.7 | 93 | 15 | 377 | 125 | 4 | 177 | 8 |
| White Oak Bayou | 110 | 20 | 3.5 | 57 | 11 | 232 | 167 | 4 | 75 | 8 |
| Median | 134 | 23 | 4.6 | 57 | 10 | 224 | 62 | 2 | 88 | 5 |
| Maximum | 1,099 | 127 | 12.5 | 185 | 24 | 949 | 229 | 5 | 479 | 17 |
| Minimum | 25 | 4 | 0.6 | 10 | 2 | 43 | 18 | 1 | 16 | 1 |

Notes:

1. Boldface/underline indicates highest watershed load for the parameter.

Table 7.3b - Case 3: Individual Storm Total Non-Point Source (NPS) Concentrations by Watershed

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| Watershed | Area (sq mi) | NPS Concentrations | | | | | | | | |
|----------------------|-----------------|--|--|-----------------------------|-------------------------------|---|-----------------------------|-----------------------------------|-------------------------------------|----------------------------|
| | | Runoff Volume (thousand acre-ft) | Total Suspended Solids (mg/l) | Total Nitrogen (mg/l) | Total Phosphorus (mg/l) | Biochemical Oxygen Demand (mg/l) | Oil and Grease (mg/l) | Fecal Coliform (col/100 ml) | Dissolved copper (μ g/l) | Pesticides (μ g/l) |
| Project Area | 4,238 | 603 | 123 | 1.66 | 0.28 | 6.9 | 2.5 | 7,460 | 3.0 | 0.2 |
| Addicks Reservoir | 134 | 20 | 201 | 1.83 | 0.33 | 6.3 | 2.2 | 6,766 | 3.1 | 0.2 |
| Armand/Taylor Bayou | 77 | 12 | 125 | 1.88 | 0.31 | 7.6 | 4.2 | 10,535 | 3.0 | 0.2 |
| Austin/Bastrop Bayou | 213 | 30 | 136 | 1.59 | 0.28 | 5.9 | 0.9 | 4,725 | 3.0 | 0.1 |
| Barker Reservoir | 122 | 19 | 325 | 1.92 | 0.33 | 6.1 | 1.3 | 4,889 | 3.1 | 0.1 |
| Brays Bayou | 127 | 23 | 153 | 2.22 | 0.41 | 9.0 | 7.5 | 16,379 | 3.1 | 0.3 |
| Buffalo Bayou | 105 | 19 | 145 | 2.35 | 0.46 | 9.6 | 7.1 | 17,141 | 3.1 | 0.3 |
| Cedar Bayou | 211 | 30 | 130 | 1.62 | 0.29 | 6.3 | 1.2 | 5,449 | 3.1 | 0.1 |
| Chocolate Bayou | 170 | 24 | 158 | 1.56 | 0.29 | 5.3 | 0.6 | 3,873 | 3.1 | 0.1 |
| Clear Creek | 182 | 27 | 124 | 1.71 | 0.28 | 6.7 | 2.6 | 7,492 | 3.0 | 0.2 |
| Dickinson Bayou | 101 | 14 | 105 | 1.66 | 0.25 | 6.7 | 1.5 | 6,089 | 3.1 | 0.1 |
| East Bay | 288 | 39 | 106 | 1.58 | 0.27 | 6.5 | 1.2 | 5,737 | 3.0 | 0.1 |
| Greens Bayou | 209 | 33 | 121 | 2.09 | 0.38 | 9.0 | 4.3 | 12,472 | 3.1 | 0.3 |
| North Bay | 25 | 4 | 117 | 2.04 | 0.35 | 8.5 | 5.3 | 12,991 | 3.1 | 0.3 |
| San Jacinto River | 68 | 10 | 101 | 1.63 | 0.27 | 7.2 | 2.2 | 7,807 | 2.8 | 0.2 |
| Ship Channel | 166 | 29 | 133 | 2.05 | 0.37 | 8.4 | 6.4 | 14,397 | 3.0 | 0.3 |
| Sims Bayou | 93 | 15 | 131 | 2.03 | 0.35 | 8.2 | 5.1 | 12,339 | 3.1 | 0.2 |
| South Bay | 78 | 13 | 118 | 1.70 | 0.28 | 7.0 | 5.8 | 11,782 | 2.8 | 0.2 |
| Trinity Bay | 317 | 44 | 96 | 1.34 | 0.21 | 5.8 | 0.7 | 4,032 | 2.9 | 0.1 |
| Trinity River | 1,099 | 127 | 80 | 1.18 | 0.16 | 6.1 | 0.4 | 3,145 | 3.1 | 0.1 |
| West Bay | 344 | 49 | 111 | 1.55 | 0.25 | 6.3 | 2.1 | 6,356 | 2.9 | 0.1 |
| White Oak Bayou | 110 | 20 | 145 | 2.33 | 0.44 | 9.6 | 6.9 | 16,568 | 3.1 | 0.3 |
| Median | 134 | 23 | 125 | 1.71 | 0.29 | 6.7 | 2.2 | 7,492 | 3.1 | 0.2 |
| Maximum | 1,099 | 127 | 325 | 2.35 | 0.46 | 9.6 | 7.5 | 17,141 | 3.1 | 0.3 |
| Minimum | 25 | 4 | 80 | 1.18 | 0.16 | 5.3 | 0.4 | 3,145 | 2.8 | 0.1 |

Notes:

1. Boldface/underline indicates highest watershed load for the parameter.

Table7.3c - Case 3: Individual Storm Total Non-Point Source (NPS) Loads per Area by Watershed

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| NPS Loads by Unit Area | | | | | | | | | | |
|------------------------|-------------------|-------------------------------|---|------------------------------|--------------------------------|--|------------------------------|-------------------------------------|---------------------------------------|------------------------------|
| Watershed | Area (sq. mi.) | Runoff Volume (acre-ft) | Total Suspended Solids (kg/ha) | Total Nitrogen (kg/ha) | Total Phosphorus (kg/ha) | Biochemical Oxygen Demand (kg/ha) | Oil and Grease (kg/ha) | Fecal Coliform (bil. col./ha) | Dissolved copper (1/1000 kg/ha) | Pesticides (1/1000 kg/ha) |
| Project Area | 4,238 | 603 | 83 | 1.12 | 0.19 | 4.6 | 1.7 | 50 | 2.0 | 0.1 |
| Addicks Reservoir | 134 | 20 | 145 | 1.32 | 0.24 | 4.6 | 1.6 | 49 | 2.2 | 0.1 |
| Armand/Taylor Bayou | 77 | 12 | 94 | 1.41 | 0.23 | 5.7 | 3.1 | 79 | 2.3 | 0.2 |
| Austin/Bastrop Bayou | 213 | 30 | 91 | 1.06 | 0.18 | 3.9 | 0.6 | 32 | 2.0 | 0.1 |
| Barker Reservoir | 122 | 19 | <u>235</u> | 1.39 | 0.24 | 4.4 | 1.0 | 35 | 2.2 | 0.1 |
| Brays Bayou | 127 | 23 | 132 | 1.91 | 0.35 | 7.7 | <u>6.4</u> | 141 | 2.7 | 0.3 |
| Buffalo Bayou | 105 | 19 | 124 | <u>2.01</u> | <u>0.39</u> | <u>8.2</u> | 6.1 | <u>147</u> | <u>2.7</u> | <u>0.3</u> |
| Cedar Bayou | 211 | 30 | 88 | 1.10 | 0.19 | 4.2 | 0.8 | 37 | 2.1 | 0.1 |
| Chocolate Bayou | 170 | 24 | 105 | 1.04 | 0.19 | 3.5 | 0.4 | 26 | 2.1 | 0.1 |
| Clear Creek | 182 | 27 | 88 | 1.21 | 0.20 | 4.8 | 1.8 | 53 | 2.1 | 0.1 |
| Dickinson Bayou | 101 | 14 | 71 | 1.13 | 0.17 | 4.5 | 1.0 | 41 | 2.1 | 0.1 |
| East Bay | 288 | 39 | 69 | 1.02 | 0.17 | 4.2 | 0.8 | 37 | 1.9 | 0.1 |
| Greens Bayou | 209 | 33 | 92 | 1.58 | 0.29 | 6.8 | 3.3 | 94 | 2.4 | 0.2 |
| North Bay | 25 | 4 | 92 | 1.60 | 0.27 | 6.7 | 4.1 | 102 | 2.4 | 0.2 |
| San Jacinto River | 68 | 10 | 73 | 1.18 | 0.20 | 5.2 | 1.6 | 57 | 2.0 | 0.1 |
| Ship Channel | 166 | 29 | 110 | 1.70 | 0.30 | 7.0 | 5.3 | 120 | 2.5 | 0.2 |
| Sims Bayou | 93 | 15 | 102 | 1.58 | 0.27 | 6.4 | 3.9 | 96 | 2.4 | 0.2 |
| South Bay | 78 | 13 | 97 | 1.38 | 0.23 | 5.7 | 4.7 | 96 | 2.3 | 0.2 |
| Trinity Bay | 317 | 44 | 64 | 0.89 | 0.14 | 3.8 | 0.5 | 27 | 1.9 | 0.1 |
| Trinity River | <u>1,099</u> | <u>127</u> | 44 | 0.65 | 0.09 | 3.3 | 0.2 | 17 | 1.7 | 0.1 |
| West Bay | 344 | 49 | 75 | 1.05 | 0.17 | 4.2 | 1.4 | 43 | 2.0 | 0.1 |
| White Oak Bayou | 110 | 20 | 123 | 1.98 | 0.37 | 8.1 | 5.8 | 141 | 2.6 | 0.3 |
| Median | 134 | 23 | 92 | 1.32 | 0.23 | 4.8 | 1.6 | 53 | 2.2 | 0.1 |
| Maximum | 1,099 | 127 | 235 | 2.01 | 0.39 | 8.2 | 6.4 | 147 | 2.7 | 0.3 |
| Minimum | 25 | 4 | 44 | 0.65 | 0.09 | 3.3 | 0.2 | 17 | 1.7 | 0.1 |

Notes:

1. Boldface/underline indicates highest watershed load for the parameter.

Table 7.4a - NPS Loads by Land Use for Case 1 (Average Year)

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| NPS Parameter | Units | H. Den. Urb. | Residential | Open Agriculture | Barren | Wetlands | Water | Forest | Total | |
|------------------|----------------|--------------|-------------|------------------|--------|----------|-------|--------|-------|--------|
| Runoff Volume | thousand ac-ft | 766 | 371 | 567 | 593 | 21 | 187 | 164 | 345 | 3,014 |
| TSS | million kg | 157 | 46 | 49 | 147 | 57 | 9 | 0 | 17 | 481 |
| Total Nitrogen | thousand kg | 1,985 | 1,561 | 1,056 | 1,142 | 134 | 192 | 0 | 353 | 6,422 |
| Total Phosphorus | thousand kg | 350 | 362 | 84 | 264 | 15 | 14 | 0 | 26 | 1,113 |
| BOD | million kg | 8 | 7 | 4 | 3 | 0 | 1 | 0 | 3 | 26 |
| Oil and Grease | million kg | 12 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Fecal Coliform | xE15 col | 208 | 101 | 17 | 18 | 0 | 4 | 0 | 7 | 355 |
| Dissolved Copper | kg | 2,930 | 1,419 | 2,167 | 2,269 | 80 | 716 | 0 | 1,318 | 10,900 |
| Pesticides | kg | 378 | 183 | 70 | 73 | 3 | 0 | 0 | 43 | 749 |
| Total | | 6,794 | 4,051 | 4,014 | 4,510 | 311 | 1,123 | 164 | 2,110 | 23,077 |

NOTES:

1. H. Den. Urb. = High Density Urban Land Use

Table 7.4b - Percent of NPS Loads by Land Use for Case 1 (Average Year)

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| NPS Parameter | Units | H. Den. Urb. | Residential | Open | Agriculture | Barren | Wetlands | Water | Forest | Total |
|------------------|------------|--------------|-------------|------|-------------|--------|----------|-------|--------|-------|
| Runoff Volume | % of total | 25% | 12% | 19% | 20% | 1% | 6% | 5% | 11% | 100% |
| TSS | % of total | 33% | 10% | 10% | 31% | 12% | 2% | 0% | 3% | 100% |
| Total Nitrogen | % of total | 31% | 24% | 16% | 18% | 2% | 3% | 0% | 5% | 100% |
| Total Phosphorus | % of total | 31% | 32% | 8% | 24% | 1% | 1% | 0% | 2% | 100% |
| BOD | % of total | 31% | 26% | 16% | 11% | 1% | 5% | 0% | 10% | 100% |
| Oil and Grease | % of total | 87% | 13% | 0% | 0% | 0% | 0% | 0% | 0% | 100% |
| Fecal Coliform | % of total | 59% | 28% | 5% | 5% | 0% | 1% | 0% | 2% | 100% |
| Dissolved Copper | % of total | 27% | 13% | 20% | 21% | 1% | 7% | 0% | 12% | 100% |
| Pesticides | % of total | 50% | 24% | 9% | 10% | 0% | 0% | 0% | 6% | 100% |

NOTES:

1. H. Den. Urb. = High Density Urban Land Use

Table 7.5 - Summary of Non-Point Source Loads

Non-Point Source Characterization Project

Galveston Bay National Estuary Program

| CASE 1 Average Year | Runoff Volume (thousand ac-ft) | Total Suspended Solids (million kg) | Total Nitrogen (thousand kg) | Total Phosphorus (thousand kg) | Biochemical Oxygen Demand (million kg) | Oil and Grease (million kg) | Fecal Coliform (xE15 col) | Dissolved Copper (kg) | Pesticides (kg) |
|----------------------------|--------------------------------------|--|------------------------------------|--------------------------------------|---|--------------------------------------|---------------------------------|-----------------------------|--------------------|
| GBNEP | 3,010 | 481 | 6,420 | 1,110 | 26.3 | 14.2 | 355. | 10,900 | 749 |
| Lake Houston | 1,380 | 43 | 2,451 | 647 | 5.8 | 0.0 ¹ | 5.6 | 5,277 ² | 170 ³ |
| Lake Livingston | 4,660 | 57 | 14,257 | 1,955 | 14.4 | 0.0 ¹ | 1.1 | 17,821 | 575 ³ |
| Total | 9,050 | 581 | 23,128 | 3,711 | 46.5 | 14.2 | 361.7 | 33,998 | 1,494 |
| % Lakes of Total | 67% | 17% | 72% | 70% | 43% | 0% | 2% | 68% | 50% |
| <hr/> | | | | | | | | | |
| CASE 2 Wet Year | | | | | | | | | |
| GBNEP | 4,790 | 747 | 10,100 | 1,730 | 41.5 | 20.4 | 531. | 17,500 | 1,140 |
| Lake Houston | 2,200 | 68 | 3,908 | 1,031 | 9.2 | 0.0 ¹ | 9. | 8,413 ² | 271 ³ |
| Lake Livingston | 6,800 | 84 | 20,804 | 2,852 | 21.0 | 0.0 ¹ | 1.6 | 26,005 | 839 ³ |
| Total | 13,790 | 899 | 34,812 | 5,613 | 71.7 | 20.4 | 541.5 | 51,918 | 2,250 |
| % Lakes of Total | 65% | 17% | 71% | 69% | 42% | 0% | 2% | 66% | 49% |
| <hr/> | | | | | | | | | |
| CASE 3 Individual Storm | | | | | | | | | |
| GBNEP | 603. | 91.6 | 1,230. | 205 | 5.1 | 1.8 | 55.4 | 2,250 | 125. |
| Lake Houston | 2.1 | .1 | 3.7 | 1.0 | 0.01 | 0.0 ¹ | .009 | 8 ² | .3 ³ |
| Lake Livingston | 5.4 | .1 | 16.4 | 2.3 | 0.02 | 0.0 ¹ | .001 | 21 | .7 ³ |
| Total | 610.5 | 91.7 | 1,250.2 | 208 | 5.1 | 1.8 | 55.41 | 2,279 | 125.9 |
| % Lakes of Total | 1% | 0% | 2% | 2% | 0% | 0% | 0% | 1% | 1% |

NOTES:

1. Calculated assuming GBNEP Oil and Grease concentration of 0.0 mg/l.

2. Calculated assuming GBNEP Copper concentration of 3.1 µg/l

3. Calculated assuming GBNEP Pesticide concentration of 0.1 µg/l.

Table 7.6 - Case 1 (Average Year): Dissolved Heavy Metal Loads

Non-Point Source Characterization Project
Galveston Bay National Estuary Program

| Watershed | Flow (acre-ft) | Dissolved Heavy Metal Loads (Kg/yr) | | | | | | |
|----------------------|-------------------|-------------------------------------|---------------|---------------|--------------|--------------|------------|--------------|
| | | Lead | Zinc | Arsenic | Cadmium | Chromium | Mercury | Silver |
| Addicks Reservoir | 81,800 | 242 | 1,840 | 302 | 50 | 50 | 10 | 50 |
| Armand/Taylor Bayous | 70,000 | 198 | 1,510 | 247 | 41 | 41 | 8 | 41 |
| Austin/Bastrop Bayou | 121,000 | 342 | 2,610 | 428 | 71 | 71 | 14 | 71 |
| Barker Reservoir | 71,200 | 210 | 1,600 | 263 | 44 | 44 | 9 | 44 |
| Brays Bayou | 147,000 | 434 | 3,310 | 543 | 91 | 91 | 18 | 91 |
| Buffalo Bayou | 116,000 | 345 | 2,630 | 431 | 72 | 72 | 14 | 72 |
| Cedar Bayou | 153,000 | 446 | 3,400 | 557 | 93 | 93 | 19 | 93 |
| Chocolate Bayou | 94,600 | 274 | 2,090 | 343 | 57 | 57 | 11 | 57 |
| Clear Creek | 138,000 | 389 | 2,970 | 486 | 81 | 81 | 16 | 81 |
| Dickinson Bayou | 60,000 | 172 | 1,310 | 215 | 36 | 36 | 7 | 36 |
| East Bay | 193,000 | 526 | 4,010 | 657 | 110 | 110 | 22 | 110 |
| Greens Bayou | 184,000 | 543 | 4,140 | 679 | 113 | 113 | 23 | 113 |
| North Bay | 25,100 | 72 | 552 | 91 | 15 | 15 | 3 | 15 |
| San Jacinto River | 64,800 | 156 | 1,190 | 195 | 33 | 33 | 7 | 33 |
| Ship Channel | 198,000 | 552 | 4,210 | 690 | 115 | 115 | 23 | 115 |
| Sims Bayou | 90,700 | 268 | 2,050 | 335 | 56 | 56 | 11 | 56 |
| South Bay | 68,200 | 163 | 1,250 | 204 | 34 | 34 | 7 | 34 |
| Trinity Bay | 225,000 | 549 | 4,180 | 686 | 114 | 114 | 23 | 114 |
| Trinity River | 572,000 | 1,630 | 12,400 | 2,040 | 340 | 340 | 68 | 340 |
| West Bay | 212,000 | 546 | 4,170 | 683 | 114 | 114 | 23 | 114 |
| White Oak Bayou | 128,000 | 377 | 2,880 | 472 | 79 | 79 | 16 | 79 |
| Total Basin | 3,010,000 | 8,440 | 64,300 | 10,500 | 1,760 | 1,760 | 352 | 1,760 |

NOTES:

1. Loads are for GBNEP Project Area only.
2. Lake Livingston and Lake Houston Loads not included.